eurofins | Product Service

FCC TEST REPORT

FCC 47 CFR Part 15C
ISED RSS-210

License exempt radio equipment

Report Reference No. ..... :	G0M-1702-6295-TFC209LP-MU-V01
Testing Laboratory ..... :	Eurofins Product Service GmbH
Address ..... :	Storkower Str. 38c 15526 Reichenwalde Germany
Accreditation ..... :	FCC Test Firm Designation Number: DE0008 IC Testing Laboratory site: 3470A-2
Applicant's name ..... :	eResearchTechnology GmbH
Address ..... :	Sieboldstrasse 3 97230 Estenfeld GERMANY
Test specification:	
Standard..... :	47 CFR Part 15C RSS-210, Issue 9, 2016-08
Test scope…….. ..... :	complete Radio compliance test
Equipment under test (EUT):	
Product description	Spirometer
Model No.	SpiroSphere - Main Unit
Additional Model(s)	None
Brand Name(s)	SpiroSphere
Hardware version	04.04.03
Firmware / Software version	Jet_Lib + Test_APP 0.14.0 ERT App: sd_SpiroSpherePackage-v1.1.19tgz
	FCC-ID: 2AAUFSPS001 IC: 11335A-SPS001
Test result	**Passed**

Possible test case verdicts:

- neither assessed nor tested ..... : N/N
- required by standard but not appl. to test object ..... : N/A
- required by standard but not tested ..... : N/T
- not required by standard for the test object ..... : N/R
- test object does meet the requirement ..... : P (Pass)
- test object does not meet the requirement ..... : F (Fail)

Testing:

Test Lab Temperature ..... : 20 – 23 °C

Test Lab Humidity ..... : 32 – 38 %

Date of receipt of test item ..... : 2017-03-24

Date (s) of performance of tests ..... : 2017-05-02

Compiled by ..... : Wilfried Treffke

Tested by (+ signature) ..... : Wilfried Treffke .....
(Responsible for Test)

Approved by (+ signature) ..... : Christian Weber .....
(Head of Lab)

Date of issue ..... : 2017-05-12

Total number of pages ..... : 26

General remarks:

The test results presented in this report relate only to the object tested.
The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Additional comments:

Version History

Version	Issue Date	Remarks	Revised by
01	2017-05-12	Initial Release	

Eurofins Product Service GmbH
Storkower Str. 38c, D-15526 Reichenwalde, Germany

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1 Equipment (Test item) Description

Description	Spirometer	
Model	SpiroSphere - Main Unit	
Additional Model(s)	None	
Brand Name(s)	SpiroSphere	
Serial number	12567	
Hardware version	04.04.03	
Software / Firmware version	Jet_Lib + Test_APP 0.14.0 ERT App: sd_SpiroSpherePackage-v1.1.19tgz	
PMN	SpiroSphere	
HVIN	SpiroSphere	
FVIN	N/A	
HMN	N/A	
FCC-ID	2AAUFSPS001	
IC	11335A-SPS001	
Equipment type	End product	
Radio type	Transceiver	
Radio technology	custom	
Operating frequency range	112 - 205 kHz	
Frequency range	F_{MID}	128 kHz
Number of channels	1	
Channel spacing	None	
Number of antennas	1	
Antenna	Type	integrated
	Model	unspecified
	Manufacturer	eResearch Technology GmbH
	Gain	unspecified
Manufacturer	eResearchTechnology GmbH Sieboldstrasse 3 97230 Estenfeld GERMANY	
Power supply	V_{NOM}	120 VAC
	V_{MIN}	N/A
	V_{MIN}	N/A
AC/DC-Adaptor	Model	RR9KA6000YL4CRVB3046
	Vendor	Globtek
	Input	100 to 240V /50/60Hz
	Output	5V

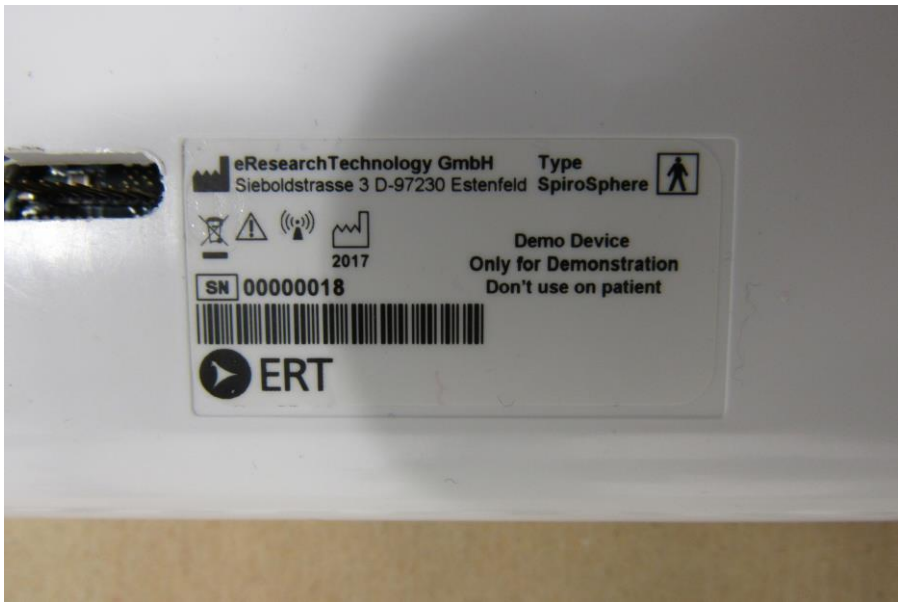
1.1 Photos – Equipment External

EUT FRONT

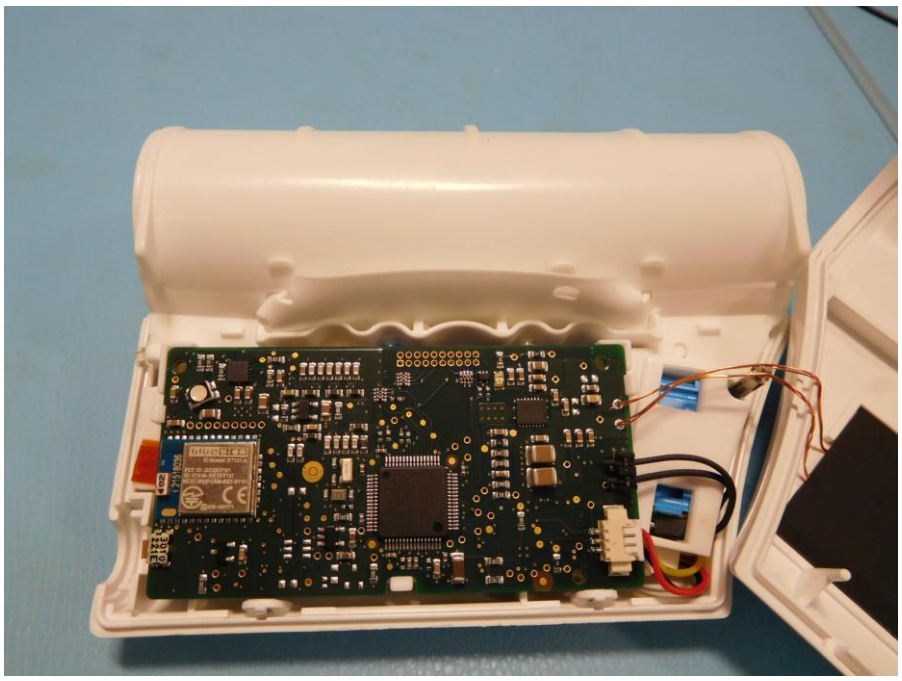
EUT BOTTOM

EUT INTERFACE

EUT Label



1.2 Photos – Equipment internal

PCB TOP


Module

Battery

AE: Sensor Unit

1.3 Photos – Test setup

Radiated Setup

1.4 Supporting Equipment Used During Testing

Product Type*	Device	Manufacturer	Model No.	Comments
AE	Spirometer	eResearchTechnology GmbH	SpiroSphere	SensorUnit

***Note:** Use the following abbreviations:

AE : Auxiliary/Associated Equipment, or

SIM : Simulator (Not Subjected to Test)

CABL : Connecting cables

1.5 Test Modes

Mode #	Description	
Charging	General conditions:	EUT powered by DC/DC adaptor
	Radio conditions:	Mode = wireless charging Power level = Maximum
Standby	General conditions:	EUT powered by DC/DC adaptor
	Radio conditions:	Mode = standalone standby

1.6 Test Equipment Used During Testing

Measurement Software			
Description	Manufacturer	Name	Version
EMC Test Software	Dare Instruments	Radimation	2015.2.4

Occupied Bandwidth					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Spectrum Analyzer	R&S	FSP 30	EF00312	2017-03	2018-03

Field strength emissions					
Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
Semi-Anechoic chamber	Frankonia	AC 1	EF00062	2017-02	2020-02
Loop antenna	R&S	HFH2-Z2	EF00184	2016-12	2018-12
Spectrum Analyzer	R&S	FSP30	EF00312	2017-03	2018-03

1.7 Sample emission level calculation

The following is a description of terms and a sample calculation, as appears in the radiated emissions data table. The numbers used in the calculation are for example only. There is no direct correlation to the specific data taken for the product described in this document:

Reading:

This is the reading obtained on the spectrum analyzer in dBµV. Any external preamplifiers used are taken into account through internal analyzer settings.

A.F.:

This is the antenna factor for the receiving antenna. It is a conversion factor, which converts electric fields strengths to voltages, which can be measured directly on the spectrum analyzer. It is treated as a loss in dB. Cable losses have been included with the A.F. to simplify the calculations. The antenna factor is used in calculations as follows:

Reading on Analyzer (dBµV) + A.F. (dB) = Net field strength (dBµV/m)

Net:

This is the net field strength measurement (as shown above).

Limit:

This is the FCC Class B radiated emission limit (in units of dBµV/m). The FCC limits are given in units of µV/m. The following formula is used to convert the units of µV/m to dBµV/m:

Limit (dBµV/m) = 20*log (µV/m)

Margin:

This is the margin of compliance below the FCC limit. The units are given in dB. A negative margin indicates the emission was below the limit. A positive margin indicates that the emission exceeds the limit.

Example only:

Reading	+	AF	=	Net Reading	:	Net reading - FCC limit = Margin
21.5 dBµV	+	26 dB	=	47.5 dBµV/m	:	47.5 dBµV/m - 57.0 dBµV/m = -9.5 dB

2 Result Summary

FCC 47 CFR Part 15C, ISED RSS-210				
Product Specific Standard Section	**Requirement – Test**	**Reference Method**	**Result**	**Remarks**
RSS-Gen 6.6	Occupied Bandwidth	RSS-Gen 6.6	N/R	Informational only
FCC 15.209 ISED RSS-210 4.3, 4.4	Field strength emissions	ANSI C63.10	PASS	
ISED RSS-210 3.1 ISED RSS-Gen 7.1	Receiver radiated spurious emissions	ANSI C63.10	PASS	
Remarks:				

3 Test Conditions and Results

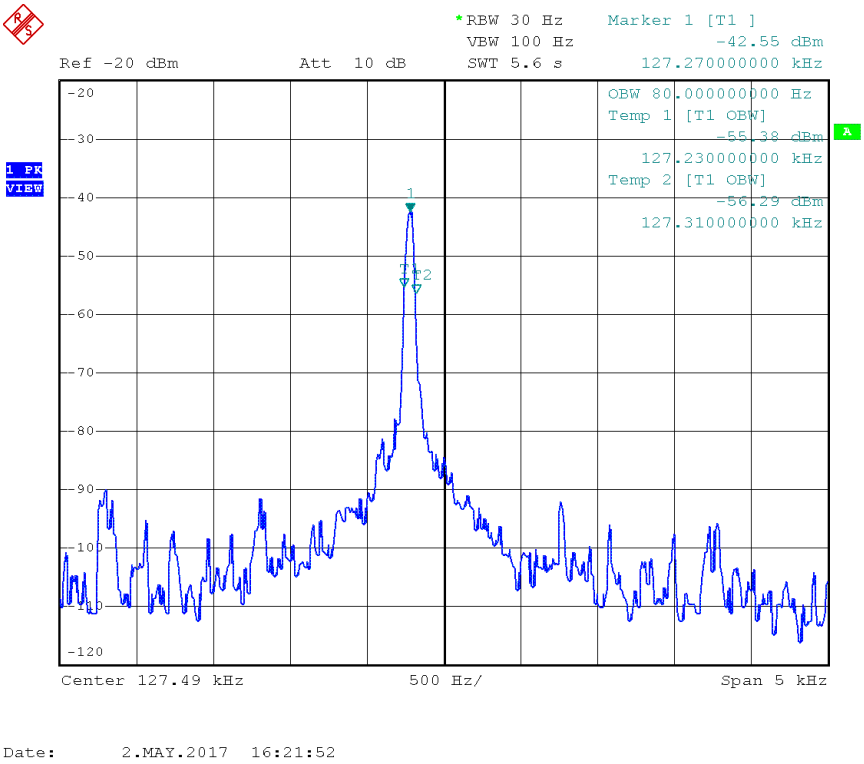
3.1 Test Conditions and Results – Occupied Bandwidth

Occupied Bandwidth acc. to ISED RSS-Gen		**Verdict: PASS**
Test according to measurement reference	Reference Method	
	RSS-Gen 6.6	
Test frequency range	Tested frequencies	
	F_{MID}	
EUT test mode	Charging	
Limits		
None (Informational only)		
Test setup		
Spectrum Analyzer — EUT		
Test procedure		
1. EUT set to test mode (Communication tester is used if needed) 2. Span set to at least twice the emission spectrum 3. Resolution bandwidth set to 1% to 5% of Ocupied Bandwidth 4. Occupied Bandwidth (99 %) measurement with spectrum analyzer built in measurement function		
Test results		
Channel	Frequency [kHz]	Occupied Bandwidth [kHz]
F_{MID}	64	0.08
Comments:		

Occupied Bandwidth - F_{MID}

Occupied Bandwidth acc. to RSS-Gen

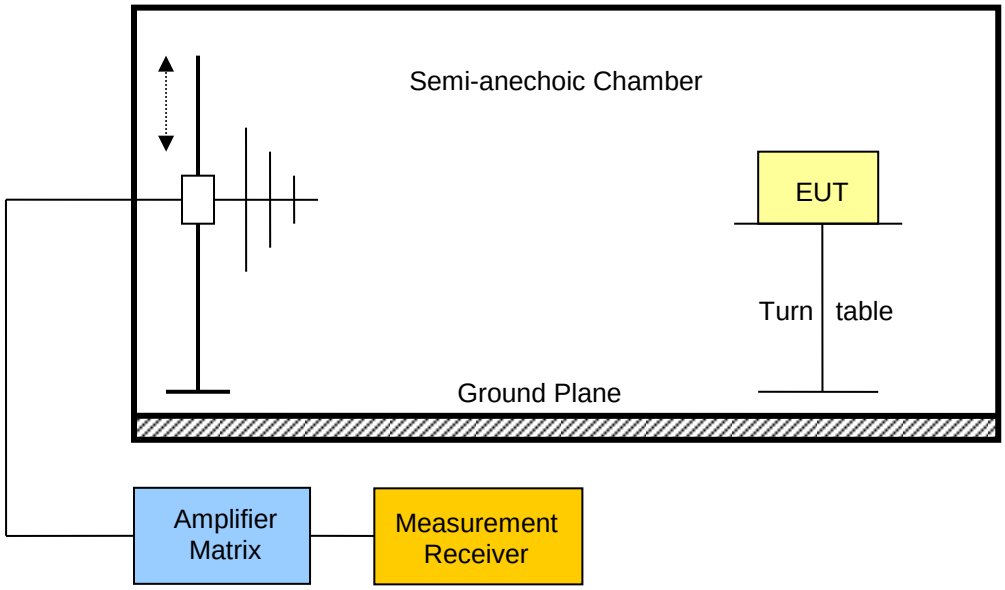
Project Number:	G0M-1702-6295
Applicant	eResearchTechnology GmbH
Model Description	Spirometer
Model:	SpiroSphere - Main Unit
Test Sample ID:	12567
Operator:	W. Treffke
Test Site:	Eurofins Product Service GmbH
Test Date:	2017-05-02
Note 1:	A spectrum analyzer with an integrated 99% power bandwidth function is used
Note 2:	NONE (INFORMATION ONLY)



3.2 Test Conditions and Results – Fundamental field strength emissions

Field strength emissions acc. to FCC 47 CFR 15.209 / ISED RSS-210				**Verdict: PASS**
Test according referenced standards		Reference Method		
		FCC 15.209 / ISED RSS-210 4.3, 4.4		
Test according to measurement reference		Reference Method		
		ANSI C63.10		
Test frequency range		Tested frequencies		
		9 kHz – 10th Harmonic		
EUT test mode		Single		
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
0.009 – 0.490	Quasi-Peak	2400/F[kHz]	48.5 – 13.8	300
0.490 – 1.705	Quasi-Peak	2400/F[kHz]	13.8 – 1.4	30
1.705 – 30	Quasi-Peak	30	29.5	30
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.				

Test setup



Test procedure

1. EUT set to test mode
2. Span it set according to measurement range
3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz
4. Markers are set to maximum emission levels

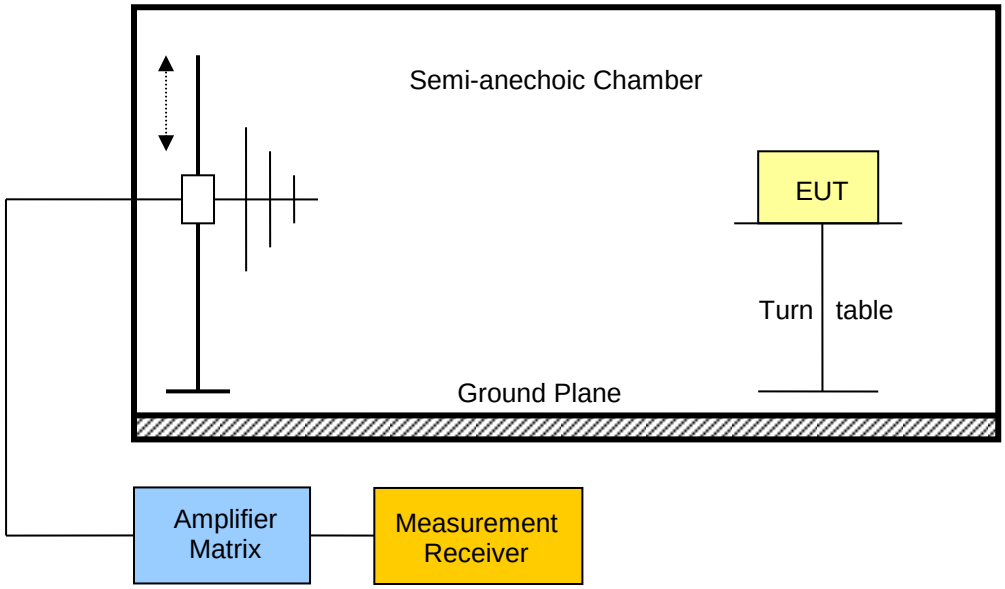
Test results

Channel	Frequency [kHz]	Emission [kHz]	Level [dBµV/m]	Detector	Limit [dBµV/m]	Measurement distance [m]*	Margin [dB]
F_{MID}	128	127.746	2.9	av	25.5	3	-22.60
F_{MID}	128	392.517	-23.1	av	15.7	3	-38.84

Comments: * Physical distance between EUT and measurement antenna.

3.3 Test Conditions and Results – Receiver radiated emissions

Receiver radiated emissions acc. to ISED RSS-210				**Verdict: PASS**
Test according referenced standards	Reference Method			
	ISED RSS-210 3.1			
Test according to measurement reference	Reference Method			
	ANSI C63.10			
Test frequency range	Tested frequencies			
	30 MHz – 5th Harmonic			
EUT test mode	Standby			
Limits				
Frequency range [MHz]	Detector	Limit [µV/m]	Limit [dBµV/m]	Limit Distance [m]
0.009 – 0.490	Quasi-Peak	2400/F[kHz]	48.5 – 13.8	300
0.490 – 1.705	Quasi-Peak	2400/F[kHz]	13.8 – 1.4	30
1.705 – 30	Quasi-Peak	30	29.5	30
30 – 88	Quasi-Peak	100	40	3
88 – 216	Quasi-Peak	150	43.5	3
216 – 960	Quasi-Peak	200	46	3
960 – 1000	Quasi-Peak	500	54	3
> 1000	Average	500	54	3
Test setup				



Test procedure						
1. EUT set to receive mode (Communication tester is used if needed) 2. Span it set according to measurement range 3. Resolution bandwidth below 1 GHz is set according to CISPR 16 with peak/quasi-peak detector and RBW of 1 MHz with peak/average detector is used above 1 GHz 4. Markers are set to peak emission levels						
Test results						
Channel	Frequency [kHz]	Emission [kHz]	Emission Level [dbµV/m]	Det.	Limit [dBdµV/m]	Margin [dBµV/m]
F_{MID}	N/A	178.531	-4.9	av	22.6	-27.48
Comments:						

ANNEX A Transmitter Field Strength Emissions

Carrier according to FCC 15.209

Project number: G0M-1702-6295

Applicant:	eResearchTechnology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Main Unit
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 20°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 300 m
Mode:	TX; Charging
Test Date:	2017-05-02
Note:	carrier

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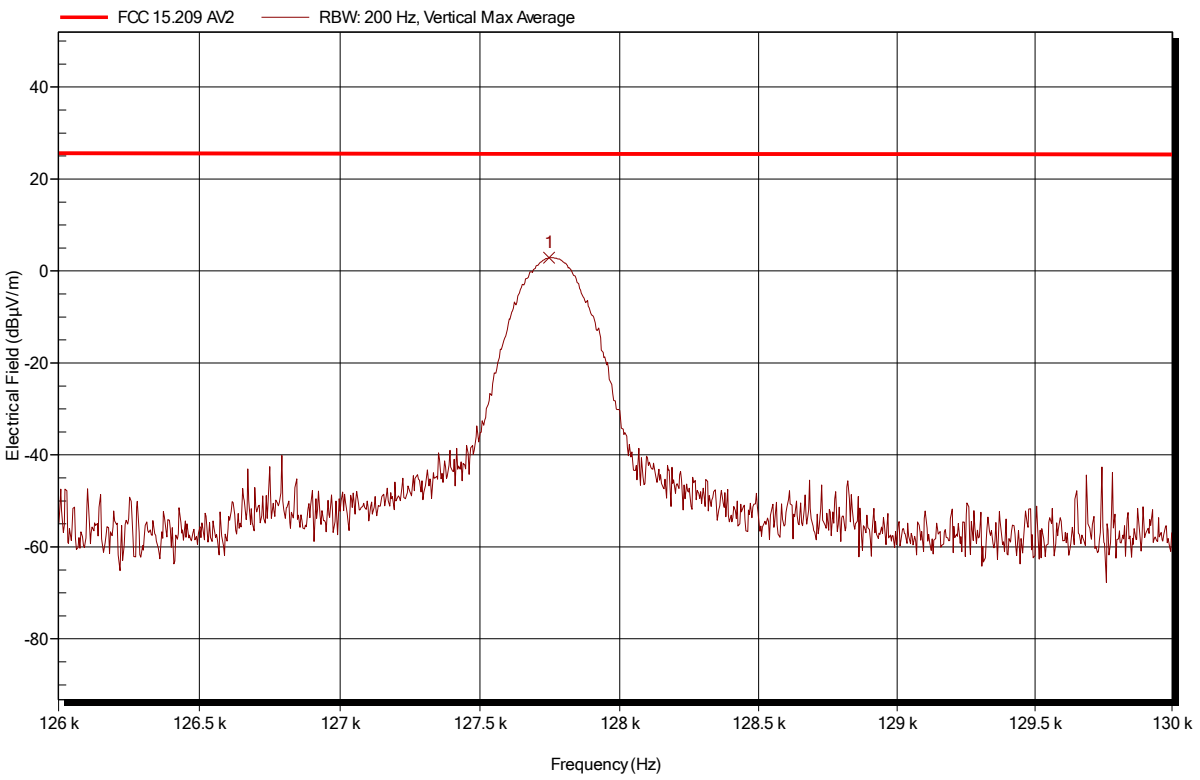

Frequency	Average	Average Limit	Average Difference	Average Status
127.746 kHz	2.9 dBµV/m	25.5 dBµV/m	-22.61 dB	Pass

Spurious emissions according to FCC 15.209

Project number: G0M-1702-6295

Applicant:	eResearchTechnology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Main Unit
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 20°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 300 m
Mode:	TX; Charging
Test Date:	2017-05-02
Note:	

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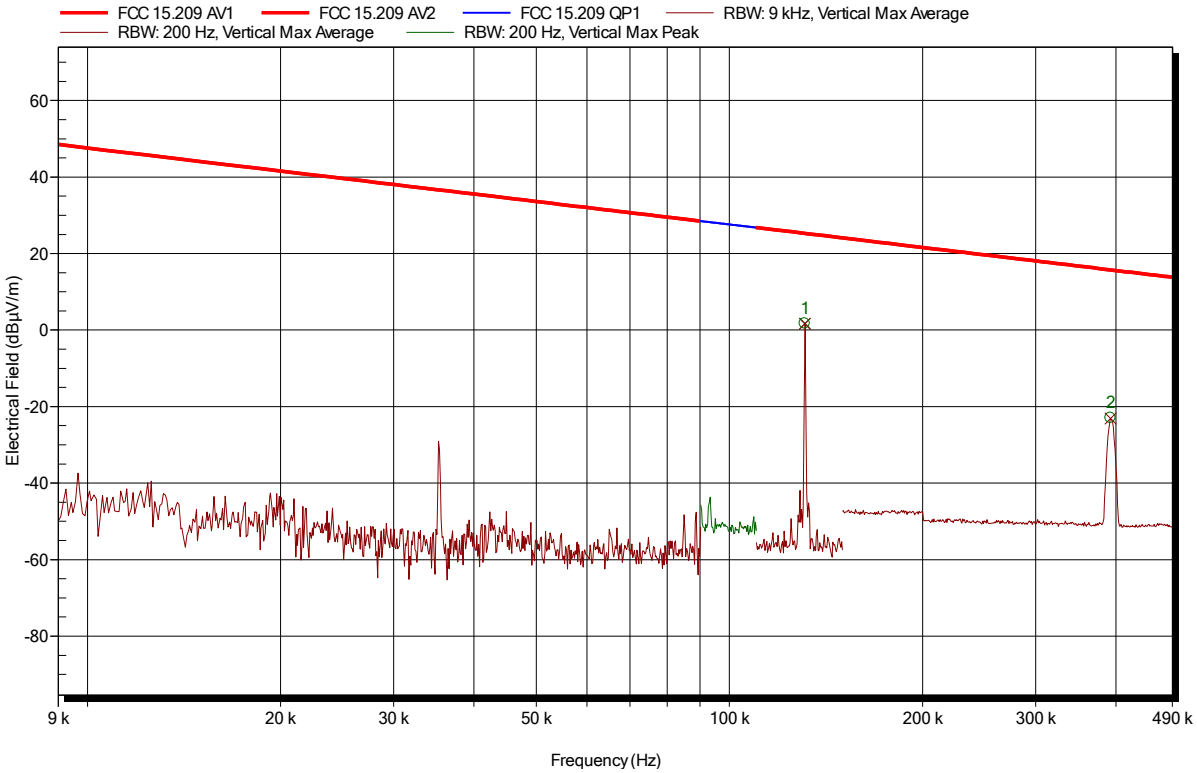

Frequency	Average	Average Limit	Average Difference	Average Status
130.979 kHz	1.7 dBµV/m	25.3 dBµV/m	-23.62 dB	Pass
392.517 kHz	-23.1 dBµV/m	15.7 dBµV/m	-38.84 dB	Pass

Spurious emissions according to FCC 15.209

Project number: G0M-1702-6295

Applicant:	eResearchTechnology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Main Unit
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 20°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 30 m
Mode:	TX; Charging
Test Date:	2017-05-02
Note:	

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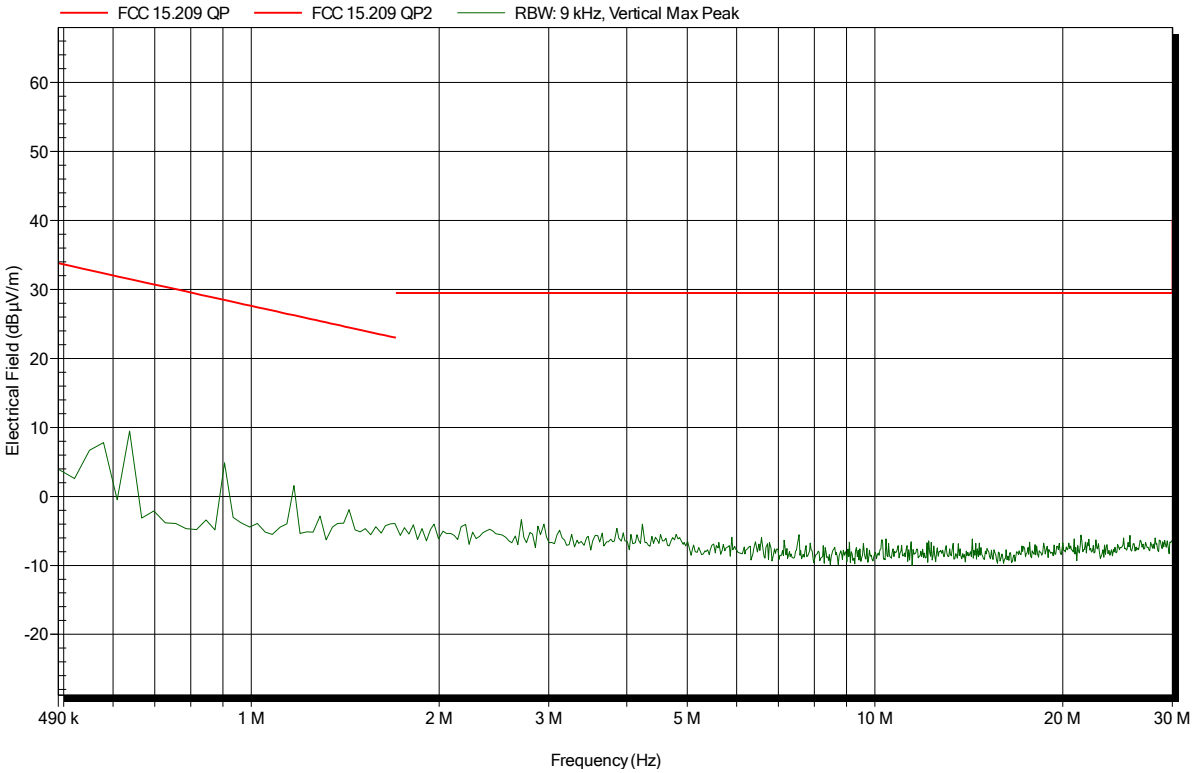

ANNEX B Receiver Radiated Spurious Emissions

Spurious emissions according to FCC 15.209

Project number: G0M-1702-6295

Applicant:	eResearchTechnology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Main Unit
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 20°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 300 m
Mode:	TX; no charging
Test Date:	2017-05-02
Note:	Standby

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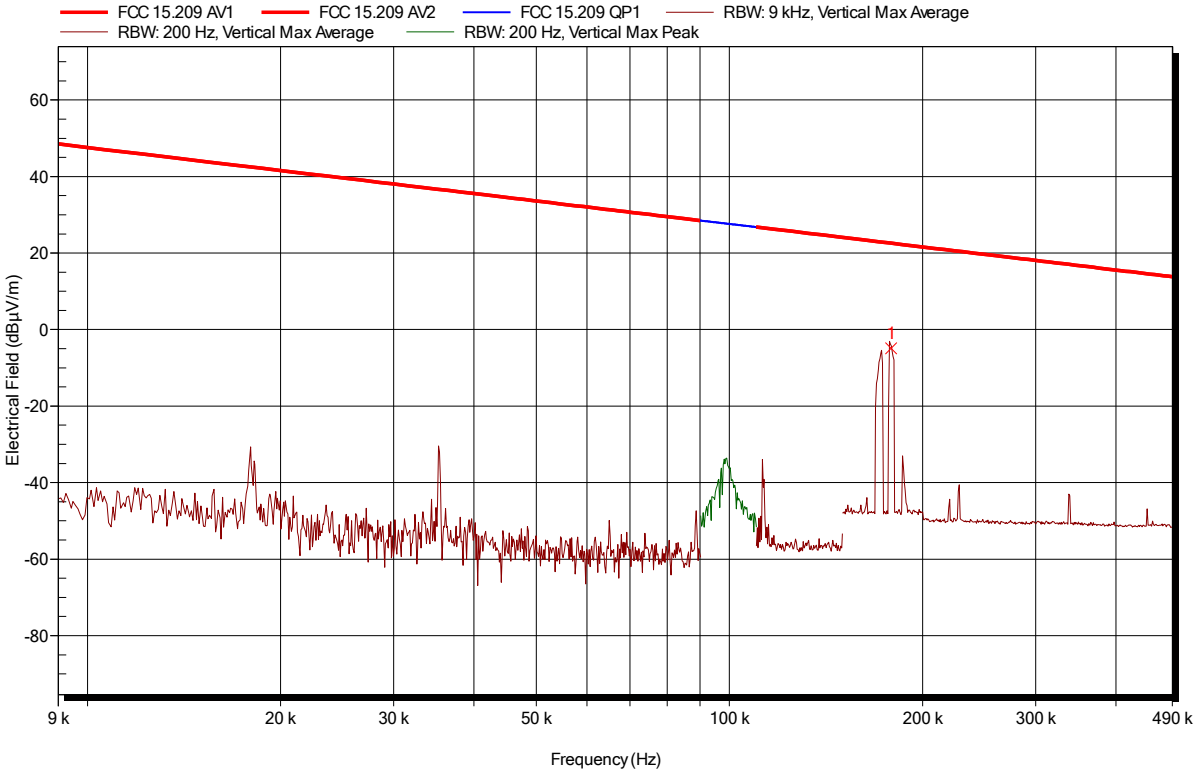
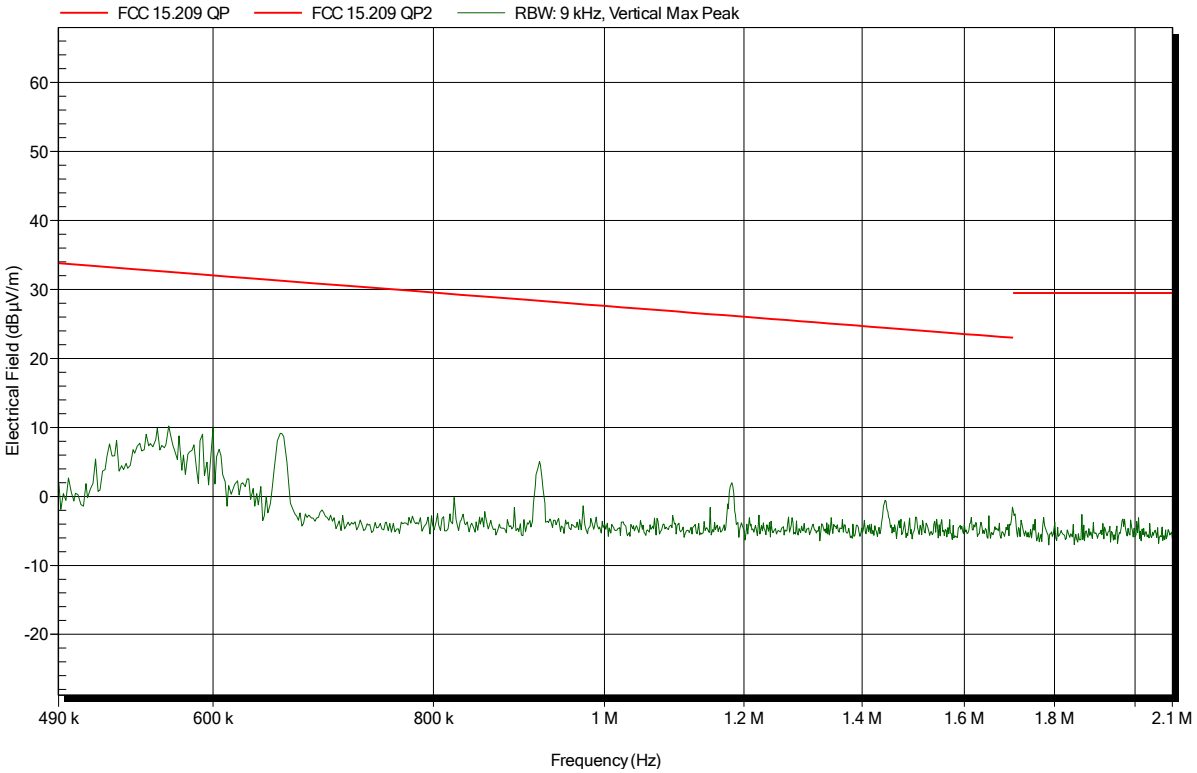


Frequency	Average	Average Limit	Average Difference	Average Status
178.531 kHz	-4.9 dBµV/m	22.6 dBµV/m	-27.48 dB	Pass

Spurious emissions according to FCC 15.209

Project number: G0M-1702-6295

Applicant:	eResearchTechnology GmbH
EUT Name:	Spirometer
Model:	SpiroSphere - Main Unit
Test Site:	Eurofins Product Service GmbH
Operator:	W. Treffke
Test Conditions:	Tnom: 20°C, Vnom: 120 VAC
Antenna:	Rohde & Schwarz HFH 2-Z2
Measurement distance:	3 m converted to 30 m
Mode:	TX; Charging
Test Date:	2017-05-02
Note:	Standby

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